



**ALLIANCE OF RESIDENTS CONCERNING O'HARE, Inc.**

“a grass roots organization”

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February 25, 2004

Re. **Docket Number FAA-2003-16526**

To: DOT Docket Management <http://dms.dot.gov>

ARECO is pleased to provide the following comments in the matter of the FAA's Stage 4 Aircraft Noise Standards rulemaking, 14 CFR Parts 36 and 91, [Docket No. FAA-2003-16526; Notice No.03-12] RIN 2120-AH99

The Alliance of Residents Concerning O'Hare is the leading U.S. air transportation citizen organization protecting the public's health, safety and welfare. We represent residents in 41 communities, including airport workers and many top experts as well as cities, national organizations and Baylor University, School of Aviation and Air Sciences and others and interact daily with numerous other similar organizations and professional individuals worldwide on issues of science, technology, health and public policy.

The FAA is proposing to modify 14 CFR Parts 36 and 91 rules in order to incorporate “Stage 4” noise standards recommended by the International Civil Aviation Organization (ICAO). Our comments in those regards are as follows.

**(1) The FAA should not do radical surgery on the existing Parts 36 and 91 regulations by changing substantial portions to “incorporation by reference” to ICAO's Annex 16 document and should instead make only the minimal changes required to add Stage 4 requirements to the rules.**

The proposed rulemaking radically extends the questionable practice of “incorporation by reference” by excising substantial portions of the existing rules in Parts 36 and 91 and substituting reference to ICAO documents, primarily Annex 16, specifically:

International Civil Aviation Organization (ICAO) Annex 16, Environmental Protection, Volume I, Aircraft Noise, Third Edition, July 1993, Amendment 7, March 21, 2002.

There appears to be no good reason to do this, as this proposed rulemaking supposedly only modifies the existing rules (which already include everything through Stage 3) to add the Stage 4 requirements. This can be handled almost in entirety by adding in (ref. background):

*“In accepting Chapter 4 standards, the FAA interprets the Chapter 4 requirements of Annex 16 as follows: (1) None of an airplane's maximum noise levels (flyover, lateral, and approach) may be greater than the maximum permitted noise levels for Chapter 3 airplanes, as defined in Annex 16; and (2) To determine Stage 4 compliance, an airplane's maximum flyover, lateral and approach noise levels are each subtracted from the maximum permitted noise levels. The differences obtained are the noise limit margins, to be used as follows: (a) When the three margins are added together, the total must be 10 EPNdB or greater; and b) When any two of the margins are added together, the sum must be 2 EPNdB or greater.”*

Furthermore, one of the key reasons to use “incorporation by reference” is to reference a document that is of a changing nature, so as to avoid having to change the rules every time the referenced document changes. This does not, on the surface, apply here as the references are to a specific, dated document(s) i.e. “Third Edition, July 1993, Amendment 7, March 21, 2002.”

However, this incorporation move is insidious in that Chapter 4 (Amendment 7, March 21, 2002) in itself is a referencing document, referencing Appendix 2 and Chapter 3 of Annex 16. Thus, for example, Chapter 4.5, Noise certification reference procedures, states, “The noise certification reference procedure shall be as specified in Chapter 3, 3.6.” In other words, ICAO, an international United Nations organization may make whatever changes it desires to reference procedures in 3.6 and these changes will be automatically incorporated into these (proposed) FAA rules, without any need for participation in the issue by non-ICAO interests. This is totally unacceptable, even with concurrent changes and substantial improvement to public interest participation in ICAO, which today is basically naught. [ICAO membership theoretically allows non-voting “observers” but these observers are primarily air industry interests. See Appendix 1 for current observer list.]

“Incorporation by reference” here removes all public free access to the existing rules by requiring that any citizen or organization, including non-profit organizations, with a vested interest in these rules procure the Annex 16 document from ICAO for \$150. Considering that there are at least hundreds of interested U.S. citizens and organizations, this represents an undue burden on these interests and either a large profit windfall for ICAO or a government induced reduction of participation of the interests in this matter.

This is especially egregious in that most airport and airline interests already have access to the documents within their corporations due to ICAO participation. They would also generally have unlimited copying of the ICAO documents within their corporate boundaries.

We believe the Director of the Federal Register erred in this regard [Ref.: “*The Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51 approved this incorporation by reference.*”, in the background information and in other places.] Further, we believe that this unwarranted and unneeded cost/access imposition placed upon the private interest community is both wrong and in violation of the small entity economic impact requirements. [Ref.: “*In view of the minimal cost impact of the proposed rule, the FAA has determined that this proposed rule would not have a significant economic impact on a substantial number of small entities. Accordingly, the FAA certifies that this proposal would not have a significant economic impact on a substantial number of small entities.*” In the background information.

We strongly believe that “incorporation by reference” of the ICAO documents should be removed from this proposal and that the FAA should instead make the minimal modifications to the rules necessary to incorporate Stage 4 requirements specifics.

**(2) The ICAO does not consider the costs of noise impacts and changes thereof in their decision-making equation. Thus, the decision on Stage 4 noise specifications is inherently flawed and should not be accepted by the U.S. and implemented into law by the FAA.**

We first quote from the background in this proceeding:

*In reaching a recommendation for a new ICAO noise standard for subsonic jet and large transport airplanes, the CAEP considered estimates of comprehensive costs and benefits*

*associated with the various noise stringency and phaseout options. The technical working group charged by the CAEP to conduct the costs and benefits analysis made several key assumptions. These assumptions together with the issues arising from some of these are set out below:*

*New Production Assumption.....*

*Recertification.....*

*Price of Improved Technology.....*

*Impact on Asset Values.....*

It is abundantly clear that all of the “costs” perceived by the ICAO and its CAEP committee members are only costs to the airline industry and do not include costs to airports, noise-impacted citizens and taxpayers. These costs include health and annoyance costs, loss of property values, noise mitigation costs, etc.

There may have been some consideration of “benefits” to these communities but such are not evident or presented in this proceeding. As a matter of fact, the FAA itself agrees with this observation in stating, under Environmental Analysis is, “...*this rulemaking action qualifies for a categorical exclusion because no significant impacts to the environment are expected to result from its finalization or implementation...*”

The FAA should reconsider its automatic movement to incorporate the ICAO Stage 4 recommendation in that the recommendation is flawed because the basis of the costs/benefits of the decision making process were incomplete and inadequate.

**(3) The ICAO’s recommended Stage 4 noise certification level, as proposed for adoption into 14CFR36/91, is woefully inadequate, is designed to minimize any associated airline costs and is structured to allow almost all currently flying aircraft to meet the new standard and thereby does not at all challenge technological change in the industry. The FAA should instead implement significantly tighter specifications that also are designed to drive the industry toward continuing and timely improvement. AReCO recommends a method to do this, which we think is win-win for all parties.**

First, we are unable to comment as adequately as we would like to on the technical issues put forth by this proceeding, as a result of the restricted access to the referenced ICAO documents, specifically Annex 16, as discussed above. We shall proceed however, with a basis on existing FAA rules (reflective of Annex 16), instant proceeding background information and previously published ICAO information.

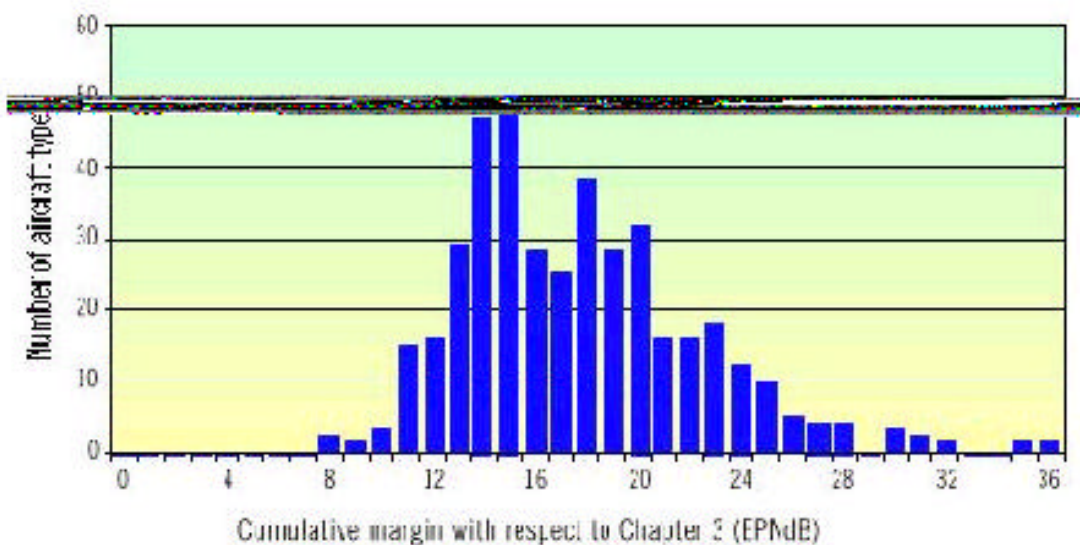
We strongly disagree with the proposed Stage 4 noise certification levels, timing and fleet applicability and recommend that the FAA, in consult with the USEPA, implement substantially more stringent noise level standards, standards that are at the same time progressive in bringing about vitally needed changes to the burgeoning noise problems surrounding all airports today.

Specifically, it is our understanding that the airline-dominated ICAO has set forth Chapter 4 noise standards that are only very minimally tighter than the existing Chapter 3 requirements and not even detectable to the human ear. The degree of tightening is purposely made to appear to be 10dB, but is only actually about 3.3dB, since the 10dB total is actually the sum of the differences of Stage 4 vs. Stage 3 for each of the three measurement points (approach, takeoff and sideline/lateral). [This is affirmed by the FAA in the NPRM background information.] Even the airports’ organization,

Airport Council International-North America (ACI-NA), saw the extreme weakness of such minimal change over such long time frames and recommended a 14dB increase, which was rejected by ICAO.

Finally, ICAO imposed the Stage 4 requirement on only new engines produced after 2006, with no retroactive actions applied to the existing fleet (now primarily Stage 3 certified), though it is clear that the intent was to let many as possible of the existing Stage 3 aircraft to file for an upgrade to Stage 4, without any modification. This is evidenced in the ICAO's own chart (Figure 1, below) that clearly (and embarrassingly) shows that just a few of the currently flying aircraft would not meet the new Stage 4 specification (the three small bars on the left...a few percent of the total). The FAA recognizes this fact in the background discussion:

*"The proposed rule is a representation of current industry practice and of projected technologies. All but four currently produced aircraft types meet the proposed Stage 4 standards."*



**Figure 1. Distribution of margins in aircraft types using today's best noise reduction practices.**

(Source: ICAO)

One might ask, why is ICAO (and “incorporated by reference”, the FAA) so concerned about having the bulk of flying aircraft meet the new specification when the ICAO strongly positions that the new standard shall not be applied retroactively (and only applied to new post-2006 aircraft)? We can only conclude that it is because ICAO (and by default, the airlines) want to ensure that they can quickly and easily recertify basically all Stage 3 aircraft to Stage 4 specifications, without any substantial effort or changes, in order to position these aircraft designs for a newly noise certified life of almost...forever.

This Luddite perspective from an otherwise “high technology” viewed industry is, to say the least, unsettling, but may have some basis in how ICAO and the air industry view the future potential for new constraints, as seen in the following article [originally published in "ICAO Journal", Vol. 53, No. 6, July/August 1998, in regard to NOx standards setting deliberations].

"The criterion of economic reasonableness has two aspects. Firstly, CAEP undertook studies to assure itself that the compliance costs would be small. This is to be expected since most recent engine designs already comply with the new requirement. The other aspect, that of fleet asset values, is one that figured largely in States' rejection of the CAEP/3 proposal.

In the past, when there have been increases in noise limit stringency, which applied to future production of existing aircraft types, there has been a tendency for national and/or multinational operating restrictions on non-compliant aircraft to follow. This has lead inevitably to a loss in value of the aircraft affected. CAEP/4 has sought to overcome this problem by making the new requirement applicable to new designs (those manufactured after 2003) only. Since future production of existing engines is not subject to the provision, it is believed that existing fleet asset values are protected."

It is very apparent that maintaining bottom line profit is their strongest motive. It is also instructive in that ICAO carries built-in expectations that as soon as Stage 4 requirements are put in place, states will push to retroact those requirements back into the existing (Stage 3) fleet (so let's plan ahead for this probability by ensuring 99% of the existing fleet can meet new requirements)!

We strongly disagree with this cost and risk minimization approach of setting standards that ensure maintenance of the status quo with little or no incentive to drive advances in aircraft design technology, i.e. a technology-driven, forward-thinking approach.

The average layman could observe the above chart and conclude "by eyeball" that a technology driven approach for new aircraft design would call for a Stage 4 minimum specification of about 18dB improvement (which is still actually only a "real" improvement of about 6dB, based on the ICAO and now FAA's "sum of differences" approach, while 10dB of real improvement is required to reduce loudness approximately in half).

As a matter of fact, ARECO's recommendation (via US-CAW at that time) to ICAO/FAA during the deliberations leading to the final Stage 4 approval was as follows:

US-CAWA'S CHAPTER 4 RECOMMENDATIONS FOR IMPROVEMENTS TO THE NOISE STANDARDS FOR THE CURRENT ICAO ASSEMBLY MEETING:

an 18dB (decibel) reduction with a gradual phase-out program consisting of:

- 10dB for ALL planes after 2003 (not just new production)
- 12dB for ALL planes after 2006, -18dB for new plane production
- 15dB for ALL planes after 2010, -20dB for new plane production
- 18dB for ALL planes after 2015, -23dB for new plane production

It is very important to note that this recommendation carries with it not only "numbers" but also attempts to change the current policies and procedures in recognition of ICAO's future-fears and in additional recognition that an improved evolutionary approach is required in order to achieve the technology driven end result that can lead to real airport noise improvements in reasonable

timeframes.

That is, not only should new aircraft/engine designs seek out substantial technological improvements, but also the existing fleet cannot be totally immune to subsequent improvements. This is almost mandatory, considering the relative long lives of aircraft i.e. if no existing aircraft changes, then no substantial net environmental noise improvements will be seen. The policy being pursued now is basically “How can we prevent any material change to the existing fleet?” whereas, the correct policy should be to not hide these concerns and instead pursue “How can changes be made to the existing fleet in a timely, cost effective manner to substantially reduce overall fleet noise impact in the future?”

A major part of the problem is, as mentioned above, that “cost” is paramount (perhaps behind safety) in the minds of the airline industry and that, like other huge and sometimes monopolistic industries, the only thing that often works is to put in place penalties for not moving forward. Our recommendation above, which we stand behind, certainly does that, while attempting to minimize airline costs through phased implementation. However, on further reflection, we recommend an enhancement to that recommendation.

This enhancement is stimulated in part by the FAA’s consideration (in the background) that:

*“Therefore, the proposed rule would have minimal, if any, cost. However, in order to meet the proposed Stage 4 standard, weight and engine constraints could be imposed on certain aircraft configurations.”*

We propose, rather than the current black-or-white approach of “meets or doesn’t meet the specification”, that a cost incentive be injected into the situation, such that airlines could in some cases continue to operate certain noisier aircraft but would be incented by increasing costs to either modify them or retire them from their fleet. [The very best example of the benefits of this market/technology driven approach came about when post-9/11 business contractions forced the airlines to retire old, noisy, fuel-inefficient aircraft; a significant net noise reduction resulted.

Aircraft whose noise certification level falls below the minimum requirements set forth above would have their maximum takeoff payload weight restricted in proportion to how far off the noise mark they were.

This would work in this fashion. An aircraft’s maximum range (R) is determined, based on its maximum rated (sea level, summer) takeoff weight (TOW<sub>max</sub>, determined by manufacturer). The aircraft’s minimum takeoff weight (TOW<sub>min</sub>, would be determined assuming it carried no payload but only an amount of fuel necessary to travel its rated range. The difference between these two weights is TOW<sub>max</sub> – TOW<sub>min</sub> = W.

The aircraft’s operation at any and all U.S. airport would be restricted to an allowed maximum daytime takeoff weight (TOW<sub>ad</sub>) of:

$$\text{TOW}_{ad} = \text{TOW}_{min} - W(\text{dB}_{certified} - \text{dB}_{standard})/10$$

And a maximum nighttime takeoff weight (TOW<sub>an</sub>) of:

$$\text{TOW}_{an} = \text{TOW}_{min} - W(\text{dB}_{certified} - \text{dB}_{standard})/5$$

with TOW<sub>ad</sub> and TOW<sub>an</sub> not to exceed TOW<sub>max</sub>

What this does is to reduce the allowed maximum takeoff weight to the minimum no-payload condition for full range if the subject aircraft is 10dB or more below the standard (proposed above)

[or a lesser 6dB or more for night operations]. It is noted however that even that is not a hard limit in that the operator can choose to reduce fuel load, i.e. range in trade for some pay-load (passenger and/or freight).

This proposal in effect decreases operator revenue potential from non-conforming aircraft rather than the black-or-white situation where the aircraft is either a revenue producer or not, (i.e. forced out of service). This will tend to cause poorly performing aircraft to be retired earlier, which reduces noise. Additionally, an otherwise noisy plane becomes generally less noisy as its weight is reduced, both on takeoff and landing. So even while the “non-conformer” is still in service, it has been “quieted” through this market-driven approach. Win-Win? We think so, as long as this approach is tied to the more aggressive and retroactive approach recommended above.

We strongly encourage the FAA to modify its noise certification approach to our recommendation instead of implementing the minimally beneficial ICAO recommendation for Stage 4.

**(4) The FAA should, as an integral part of this proceeding, establish a specific goal and put in place the process to achieve same, of changing the A-weighting approach to noise characterization in favor of a flat-weighted approach, or another weighting factor approach that more correctly recognizes that modern jet aircraft have noise spectrums that are generally shifted down in frequency from their predecessors.**

This general frequency downshift has exasperated noise conditions around airports and until more truthful characterizations are put in place, the noise “situation” will continue to worsen while the “numbers” become less and less correlated to the actual complaints.

A-weighting, which substantially de-emphasizes low frequencies (below 1000Hz), was originally set in place decades ago in order to supposedly simulate the human ear response to noise. Even then there was substantial controversy on the issue, including the fact that the human response has a significant level-sensitive factor not recognized by an across-the-board A-weighted application. That is, the human response indeed rolls off below 1000Hz in close correlation to the A-weighting curve, but only for normal talking level noises. For very loud noise levels, such as experienced by persons exposed to loud noise peaks from passing aircraft, the amount of human sensitivity rolloff at low frequencies is greatly reduced. [This is reasonably well known in the acoustic sciences e.g. Fletcher-Munson curves.]

It is our understanding (again we are unsure due to limited Annex 16 access) that a modified form of recognition of these facts is incorporated in the noise certification process, specifically the “NOYs” characteristic weighting, where NOYs was an attempt to more adequately characterize the annoyance factors associated with aircraft noise that simply applying A-weighting. Indeed, NOYs may be the better approach than A-weighting, though it is known that there is controversy there as well.

As part of this process, additional studies must be pursued to find better correlations of human annoyance levels as compared to aircraft noise level and spectrum characteristics (including low frequency aspects, beat notes, etc.). This (and the A-weighting issue) may not seem directly related to the instant proceeding but in-fact it is, since the whole issue is noise-certification and one cannot truly know how best to “certify” aircraft “noise” without understanding as best as possible the whole reason behind certification, which is annoyance and negative health impacts to people (including children and young babies and, to a lesser extent, to farmers stock and wildlife) and physical damage to structures.

Such studies will by definition include advanced discussion of aircraft noise peaks and repetition rates effects on annoyance/health and again question the use of the current “DNL” formulations in regulatory use. This should not be resisted by the FAA or the air industry but, instead, entered into with the hope of forging better truths that will in turn help improve airport noise and annoyance characterizations and conditions. The fact that “DNL” and specifically 65dB DNL needs reevaluation is clearly seen in the attached Volpe train-horn study excerpt (Appendix 2).

In that recent evaluation of train horn annoyance, which is similar to aircraft noise annoyance (periodic very loud noise/sound events), it was found that there was little correlation of annoyance to (65dB) DNL and that, instead, individual noise events themselves seemed more likely to cause annoyance. [This seems somewhat intuitive i.e. humans do not “average” noise events over 24 hours or even lesser periods e.g. an hour. This is due to the “forgetting” factor, important for pain as well as severe discomfort.]

A natural Resources Defense Council study, *Under the Flight Path*, found that over 99 percent of the airport noise complaints came from those victims with noise levels below 65 DNL, with over 90 percent even below 60dB DNL. There is also noise monitoring data done by communities that prove that over 1.6 million people live in the 65dB DNL or greater, while the official numbers quoted by the FAA is 400,000. Thus, even using the FAA air transport friendly minimal standard of 65dB DNL, the amount of victims of airport and aircraft noise is grossly under reported to Congress by scores of millions.

There are scores millions more affected if the American public is even adequately protected: For the last 20 years, the Environmental Protection Agency has shown in its reports and in statement that 55dB DNL is the noise level that is adequate to protect human health and welfare in a residential setting. The World Health Organization and most all-credible institutions concur.

The FAA, in close concert with the USEPA, must actively pursue modification of this permeating A-weighting policy (used in the Integrated Noise Model or INM, used for producing noise contours, used in noise monitoring, etc.) and greatly improve correlations of aircraft noise characteristics to annoyance in order to bring the air transport industry closer to good working relationships with citizens impacted by aircraft noise.

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## **APPENDIX 1**

Official ICAO “Observers nominated by: ” (from [www.icao.org](http://www.icao.org))

Greece

Norway

Airports Council International - ACI

Arab Civil Aviation Commission - ACAC

Commission of the European Communities - EC

European Federation for Transport & Environment - T&E

(Environmental NGOs)

International Air Transport Association - IATA

International Business Aviation Council - IBAC

International Co-ordinating Council of Aerospace Industries Associations - ICCAIA

International Federation of Air Line Pilots' Associations - IFALPA

United Nations Framework Convention on Climate Change (UNFCCC) Secretariat

World Meteorological Organization – WMO

## **Appendix 2**

### **Train Horn Annoyance**

Excerpted from: <http://www.volpe.dot.gov/opsad/wayhrpt/wayhcp2.html#2.2.2>

An interesting question to consider is what factors makes an auditory warning annoying? One obvious factor is proximity to the noise source. The closer one is to the noise source, the louder the horn signal should be. Another contributing factor is the frequency with which the noise source is heard. The more frequently one hears the horn, the more opportunity to become annoyed. These two factors were analyzed, along with two others, age and gender, to determine whether they were effective in predicting high annoyance levels.

Age and gender were examined to determine the degree to which characteristics of the individual contributed to annoyance. Since the sample selection resulted in a sample that differed from the general population, examining the effects of age and gender on annoyance level will address the question: did sample bias affect performance? The relationship between actual sound levels and annoyance was also examined. Chapter 3 discusses this relationship.

These four factors: proximity, frequency, age, and gender were evaluated using a logistic regression procedure. Proximity was measured by either the shortest distance of the respondent's home to the track or the distance of the respondent's home to the closest grade crossing. Both age and gender were unrelated to high annoyance. The fact that age and gender were not significantly related to high annoyance levels suggests that the results of the survey apply to the population as a whole.

No relationship between annoyance levels and proximity was found, either. This outcome was surprising, and possible explanations for this result are described earlier. Only the frequency with which respondents heard the horn was related to annoyance levels at statistically significant levels (Night:  $c = 27.39$   $df = 1$ ,  $p < .00001$ ). The correlation between frequency with which the horn was heard and annoyance level was .41 suggesting a moderately positive relationship between horn frequency and annoyance level. Sorensen and Hammar (1983) also found that train frequency affected annoyance levels. They found that annoyance levels increased up to sixty trains per day and then leveled off with train frequencies greater than sixty.

*{AReCO emphasis added}*